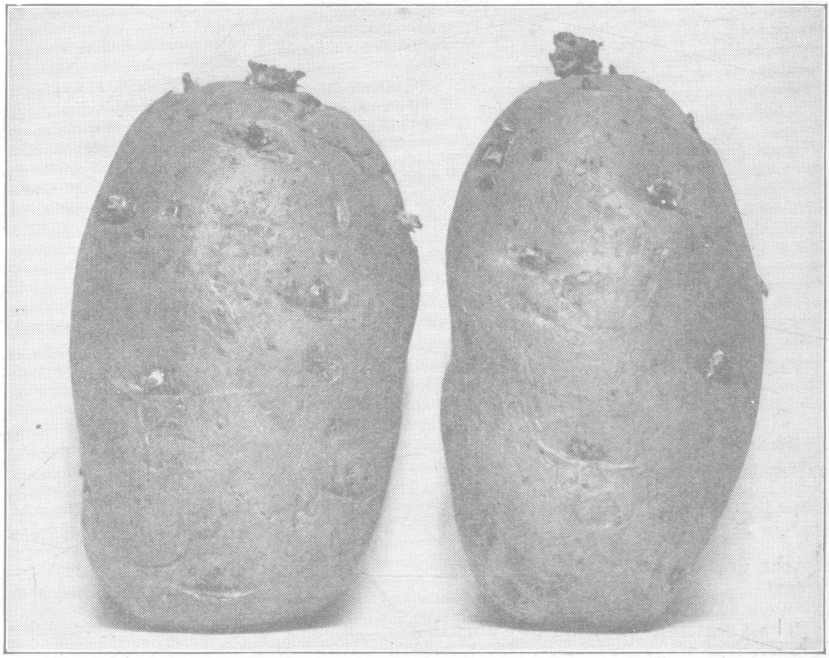
Vol. XX, No. 8 BULLETIN 1924-1925
OF THE
OHIO STATE UNIVERSITY AGRICULTURAL COLLEGE EXTENSION SERVICE
H. C. RAMSOWER, Director

Potato Growing in Ohio



By
N. W. GLINES
Extension Specialist in Vegetable Gardening

The Ohio State University, Cooperating with the United States Department of Agriculture.
AGRICULTURAL EXTENSION SERVICE, H. C. RAMSOWER, Director, Columbus
FREE—Cooperative Agricultural Extension Work—Acts of May 8 and June 30, 1914

Potato Growing in Ohio

The potato industry in Ohio has resolved itself into an early or truck crop and a late or main crop. The early section is confined to the counties in the southern half of the state. Most of the late potatoes are grown in the first two tiers of counties along the lake extending from Pennsylvania to Indiana.

The 10-year average for the state is 79.7 bushels per acre. However, this average was exceeded by 20.3 bushels in 1920, 7.3 bushels in 1922, and 16.3 bushels in 1923.

FIRST TEN OHIO COUNTIES IN POTATO PRODUCTION, 1923

	Acres Planted	Bushels Crop	Yield Bushels Per acre
Cuyahoga	8,600	860.000	100
Geauga	4,070	569,000	140
Hamilton	6,140	552,600	90
Portage	5,360	444,880	83
Medina	2,930	398,480	136
Stark	3,550	390,500	110
Lorain	3,340	384,100	115
Ashtabula	3.860	339,680	88
Erie	2,220	321,900	145
Wayne	2,330	309,890	133

REQUIREMENTS FOR PRODUCTION

The three leading requirements for successful potato production are: soil, temperature, and moisture.

Soil.—While it is true that potatoes will grow in many kinds of soil, it is also known that the best soil is a sandy, gravelly, or shaly loam. The soil must be deep, well drained, and should contain an abundance of organic matter to keep it loose and friable.

Temperature.—The potato does best in a cool climate. The greatest development of the potato growing industry has come in those sections having a mean annual temperature of between 40 and 50 degrees Fahrenheit, and where the temperature in July does not run above 70°. These temperatures are not normal in Ohio, but the growing season can be aided by observing a little later planting date in the warmer portions of the state for late crops and a mid-season planting in the northern part of the state. Potatoes setting in a warm period are very apt to be misshapened, not of good keeping quality, and are unfitted for seed.

Moisture.—Moisture is probably the most important factor in potato production. The cells of the potato must be extended with water before growth can take place. It also dissolves the plant food material in the soil and carries it to the leaves. An over-abundance of water is just as bad as too little. The moisture problem may be helped by keeping the soil abundantly supplied with organic matter which will often tide the crop through a dry period.

PREPARATION OF THE SOIL

The land should be plowed as deeply as possible without turning up too much subsoil. A good rule to follow is to plow about ½ to 1 inch deeper than it was plowed the last time. The plowing should be done preferably in the fall unless the soil is of such a character that it will wash or puddle during the winter, or unless the planting is not to be done until June.

If plowed in the fall, the field should be disked and worked down as early in the spring as possible. This aids in conserving the moisture contained in the soil. If plowed in the spring it should be disked immediately and kept worked until planting (see Fig. 1).

In preparing the seedbed the soil should be worked up as fine as possible, disking and cross disking as much as required to put the field in a good state

Fig. 1. A well prepared seedbed is necessary for the production of a good crop.

of tilth. If the field is not to be planted at once, it should be worked over, at least after every rain, to keep down the weeds and to keep it from becoming lumpy. The more often a piece is worked over the better the prospect for a good crop.

FERTILITY AND CROP ROTATION

The best yields are produced in those fields that are properly supplied with available plant food. This plant food may be obtained from commercial fertilizers, barnyard manures, and green manure crops.

Commercial Fertilizers.—The plant food must be properly balanced, as the potato is a heavy feeder of the three most essential elements. It is estimated that a crop of 200 bushels per acre removes from the soil 42.66 pounds of nitrogen, 17.28 pounds of phosphoric acid, and 56.8 pounds of potash. These

amounts could be supplied with about 270 pounds of nitrate of soda, 108 pounds of 16 per cent acid phosphate, and 110 pounds of muriate of potash.

However, there will be some waste of this material by leaching, surface washing, and through combinations formed with other materials in the soil that are insoluble and therefore lost as plant food, so that a much larger application must be made to insure the crop of enough plant food to make satisfactory growth. The following fertilizers from the "Ohio Standard Dozen" are recommended:

FERTILIZERS SUITED TO POTATOES

Other treatment	Light colored soil			Dark colored soil		
	None	Clover	Manure	None	Clover	Manure
Potatoes ..	3-8-6	2-12-6	2-14-2	2-14-2	0-14-4	0-16-0

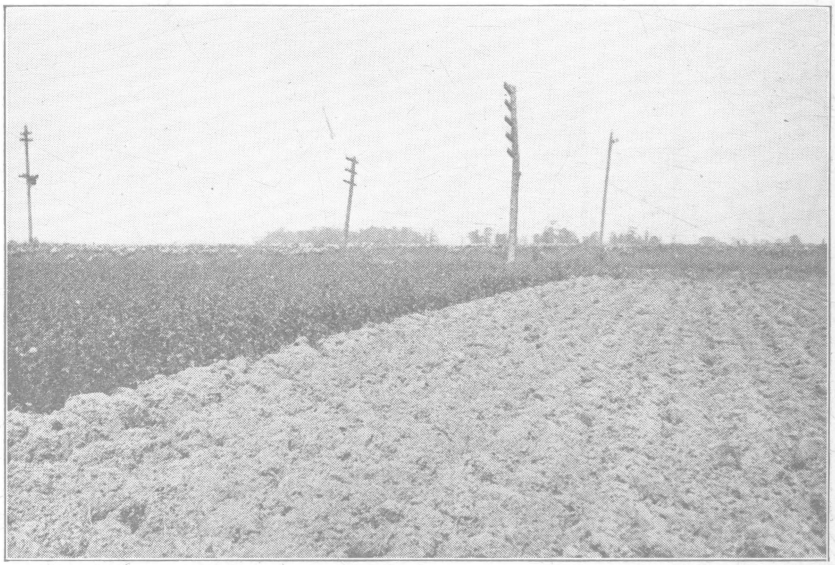


Fig. 2. Turning under sweet clover is becoming a favorite practice with successful potato growers.

The amounts per acre will vary somewhat with the purpose for which the crop is grown. An early crop on sandy soil will take a larger application than a late crop planted on a loam or heavier soil; and an early crop will require more nitrogen in starting than will the late crop. All of these things must be considered.

Green Manure Crops.—Green manuring offers the grower an opportunity to produce plant food cheaper than it can be applied in any other manner, though it must not be assumed that green crops alone will take the place of other forms of fertility. Green crops must be supplemented with either barnyard manure or commercial fertilizer, or both.

The most valuable crops for green manuring are the legumes, such as alfalfa, clovers, soybeans, cowpeas and vetch (see Fig. 2). Other green crops grown for this purpose are rye and buckwheat.

The early potato crop will work in nicely with a truck crop rotation, such as melons, cucumbers, or beans that were followed by a cover crop of rye, or rye and vetch. The potatoes in turn may be followed by a crop of crimson clover, seeded in July, and this turned under the next spring for a tomato crop. The late potato crop also lends itself well to a rotation such as potatoes, wheat, and clover. Wheat does exceptionally well after potatoes. Using those rotations the following treatments are recommended:

FERTILIZER TREATMENT SUPPLEMENTING POTATOES IN A POTATO-WHEAT-CLOVER ROTATION

Crop	Fertilizer	Pounds per acre	Manure
Early	2-12-6	800-1000	10 tons
Early	3- 8-6	1200-1500	None
Late	2-12-6	800	10 tons
Late	3- 8-6	800-1000	None

The application of commercial fertilizer should be drilled or broadcasted, at least the major portion of it. Not more than from 300 to 400 pounds may be drilled in the row with the potatoes at planting. The remainder may be applied just prior to the last working before the seed is planted, or it may be made just before disking and worked into the soil in this manner.

Crop Rotation.—Rotation of crops is necessary to maintain or increase the natural fertility of the soil, to put the soil in a good physical condition, and for the control of insects and diseases. Diseases which are carried on the seed are left in the soil to infect the crop if it is planted the following season, and makes control much harder. Insect pests that have infested the growing crop will hibernate in the vicinity and be ready for the next crop.

It is not good practice to plant potatoes oftener than once in four or five years on the same land and a longer rotation that employs several leguminous crops, either as a clover crop or for hay, can be counted upon to give the best results.

Use of Lime.—Potatoes will produce quite well in an acid soil. Lime applied just before potatoes is very apt to promote the development of scab. But to grow clovers, lime is a necessity and must be applied. But, in a rotation, it is possible to make this application on the crop just following potatoes.

VARIETIES AND SEED

The standardization of varieties is most important. Too many of the so-called varieties on the market are but some of the old friends with new names, and generally not so good as the standard varieties. Observations and tests carried on in Ohio indicate that from the production and market viewpoints the following varieties are to be recommended:

EARLY VARIETIES

The Early Ohio is the leading variety for the early crop. Vines are medium height, stout and erect in habit of growth, dark green, and the leaves are medium to large. Flowers are white. The tubers are round-oblong, with rounded seed and stem ends; eyes are numerous and shallow, often protuberant (see Fig. 3). Skin is pinkish with small corky dots.

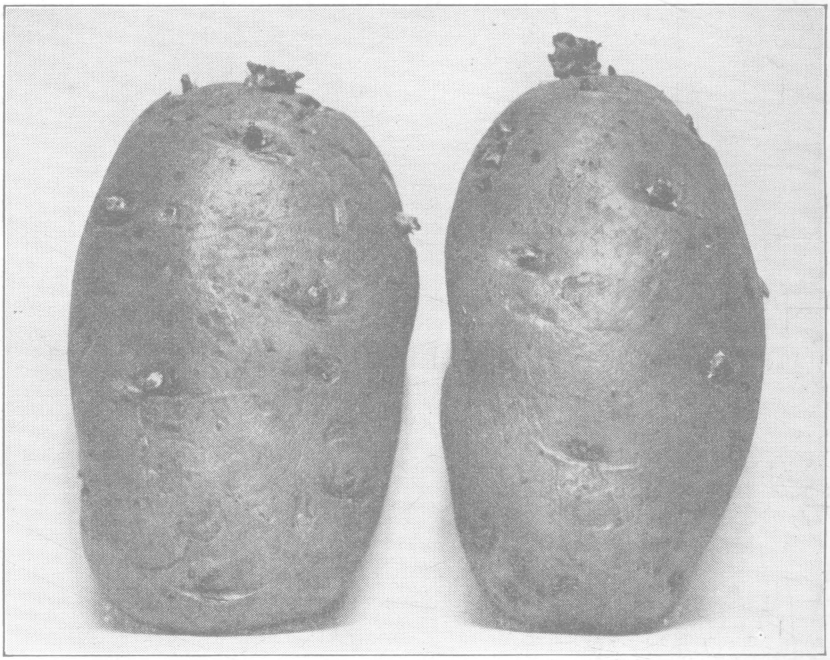


Fig. 3. Early Ohio potatoes, sprouted for three weeks. The sprouts in another week will become materially heavier.

Fig. 4. Irish Cobbler—a good early variety

The Irish Cobbler.—Vines are medium to large, somewhat sprawling in growth. Stems are dark green, stalky and short jointed. Flowers are large, light purple or rose lilac. Tubers are roundish with blunt ends, the stem end often deeply notched (see Fig. 4). Eyes are medium in number but often quite deep. The skin is smooth and light cream in color.

LATE VARIETIES

Russet Rurals.—Also called Late Petosky; medium to large, main stem upright, lateral branches sprawling in growth. Stems are streaked with purple. Flowers are violet-purple. Tubers roundish flattened to oblong flattened (see Fig. 5). Eyes shallow, few. Skin russet in color, rough netted.

White Rurals.—(This includes Rural New Yorker No. 2, Carman No. 3, and Sir Walter Raleigh.) Growth of vines and coloring same as Russet Rural. Tubers same shape (see Fig. 6), but color of skin is creamy white.

QUALIFICATIONS OF GOOD SEED

The problem of good seed is most important, for if all other practices are of the best and poor seed is used, the stand will be very poor and the resulting yield far from satisfactory. Seed must be pure as to variety; produced by vigorous growing, high yielding plants, free from diseases; somewhat immature; solid and firm in flesh.

This type of seed is more easily obtained now than a few years ago, for a good many of the potato-producing states have a system of inspection covering the above points, and are producing certified seed.

Certified seed necessarily commands a higher price than common seed, as it has been treated as a seed crop, been rogued during the growing season for diseases, and inspected after harvest. But in comparison with the increased yields obtained by the use of certified seed the cost is very slight.

Comparative tests made in the past four years indicate the value of certified seed as against ordinary seed.

INCREASE OF CERTIFIED OVER UNCERTIFIED SEED

Year	Variety	No. of tests	Average increase per acre—Bushels
1921.....	Early	50	32.4
	Late	113	45.6
1922.....	Early	75	35.8
	Late	90	49.9
1923.....	Early	40	36.7
	Late	50	46.0
1924.....	Early	33	37.5
	Late	47	52.6

Certified seed, after being grown one year under local conditions, retains some of the original vitality, but is not to be compared with new certified seed. This is due to the fact that the crop is given no special care as to diseases, is allowed to mature before harvest, and is not stored under proper conditions.

The following are results obtained in comparing the yields of certified seed, seed produced one and two years from certification:

Year certified.....	1923	1922	1921
Average yield per acre	212.2	196.8	193.5

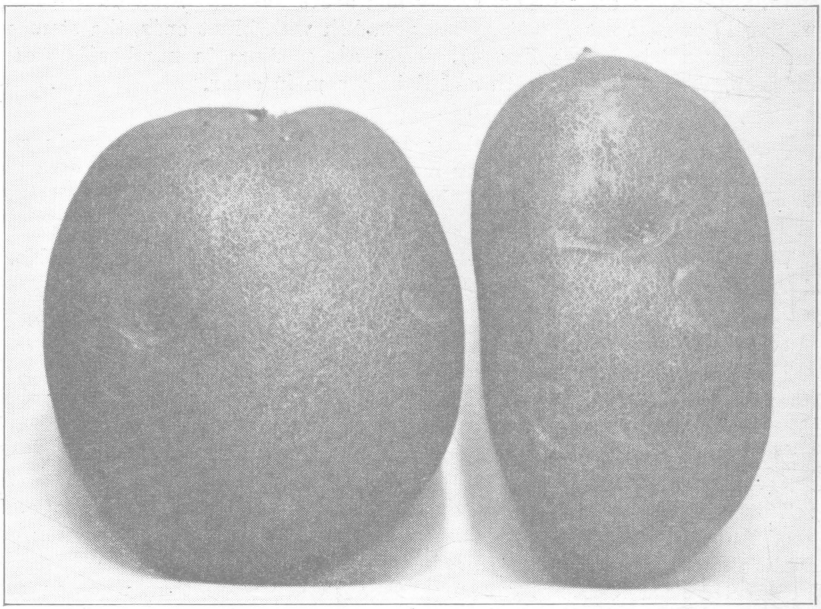


Fig. 5. Russet Rural, a recommended late variety

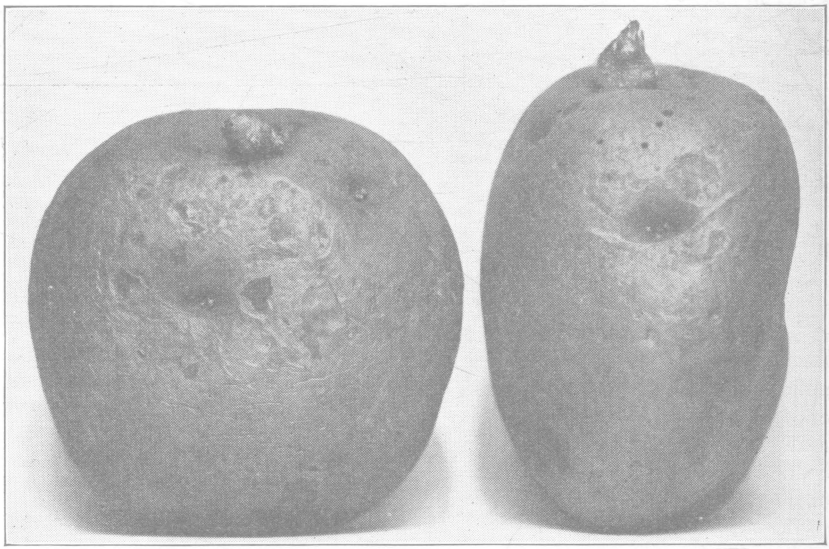


Fig. 6. White Rural.

GREENING AND SPROUTING SEED

The practice of greening and sprouting the seed before planting is common in several potato sections and may be applied to Ohio conditions with profit. Greening may be easily accomplished, especially with the late crop, by spreading the tubers out in a thin layer on the barn floor where they will be exposed to the light and will have enough heat to germinate the sprouts. The growth is very slow but exceptionally vigorous, and with most varieties is confined to the seed end. Four weeks for sprouting are recommended.

Tubers that may be diseased are easily seen and discarded, furthering the chance for a good yield. There is less chance, too, for rot developing if weather conditions are unfavorable at planting time. Benefits from greening and sprouting are not confined to a better stand and quicker maturity, but increased yield is noted.

Fig. 7. Sun-sprouted seed was used on the right of the field, and non-sprouted on the left. The entire field was planted the same day.

This method of handling seed may be used to good advantage by the growers in southern Ohio who are interested in producing the early crop, as maturity is hastened from 7 to 12 days, as well as a heavier crop resulting.

For the early market grower this method will add to the cost of production, for trays must be built and a warm room provided, so that the seed may not be frosted. The tubers are placed in shallow trays with the seed end up and arranged so that light will be afforded them. This is usually done in late February, giving the seed from four to six weeks for germination.

Seed ranging from 1½ ounces to 2½ ounces may be planted whole, but larger seed must be cut. These potatoes may all be run through the planter, as the sprouts developed are very tough and not easily broken. This practice has not only given increases ranging from 14 to 25 bushels per acre, but has also produced marketable potatoes from 7 to 10 days earlier (see Fig. 7).

TREATING THE SEED

All seed, including certified seed, should be treated before planting. In some cases certified seed is treated before shipping, and in this case there would be no advantage in duplicating the treatment, but with seed that is not treated it is advisable to use either the formaldehyde or corrosive sublimate method. This insures the grower that even the small percentage of scab or rhizoctonia present may be cared for.

Formaldehyde Treatment.—The formaldehyde treatment consists in soaking the uncut tubers from ½ to 1 hour in a solution of 1 pint of 40 per cent formaldehyde to 30 gallons of water. The tubers should be spread out in a thin layer to dry, and then may be replaced in containers that have been sterilized, or in new ones. This treatment is effective in controlling scab but does not control rhizoctonia.

Corrosive Sublimate Treatment.—The corrosive sublimate treatment consists in soaking the uncut tubers for a period of 1 to 1½ hours in a solution of 4 ounces of corrosive sublimate to 30 gallons of water. If the tubers are not heavily infected with scab or scurf, the time of treatment may be cut to ½ hour.

The corrosive sublimate crystals may be dissolved in hot water placed in a wooden vessel, and then diluted to 30 gallons. As this solution loses strength with every treatment, it is not advisable to treat more than three batches of seed before renewing the solution. It is also very poisonous, and must not be left where small children or stock may get to it. This method of treatment is advised over the formaldehyde treatment because it is effective in the control of scurf as well as scab, and is as easy to use.

If the tubers are to be greened or sprouted it would be advisable to treat the seed first, although a short treatment of 20 minutes or ½ hour with either solution would not injure the sprouts.

CUTTING THE SEED

The size of the seed piece will depend a great deal on the size of the seed on hand. The pieces should be cut blocky and with two eyes, and should weigh from 1¼ to 2 ounces. Considerable discussion is made as to the advisability of planting large seed pieces and whole seed, but evidence seems to show that above 2 ounces there is little if anything to be gained.

In planting whole sprouted seed, only the smaller tubers weighing about 2 ounces are used. This does not mean that the small tubers from *any* crop may be selected and planted whole with the expectation of producing a maximum crop. Only the small tubers from a *high yielding strain* should be used.

Seed potatoes are mostly cut by hand, though when labor is scarce and a large acreage is to be planted a seed cutter having stationary knife blades mounted in a frame is a great advantage. The disadvantage of using a seed cutter is that there will be a greater tendency to get seed pieces with only one eye, or with weak eyes.

The seed should be cut about time to plant, so that they will not dry out before using. It often happens that after cutting, planting will be delayed for a few days or a week. If this delay is likely to occur, it is best to dust the freshly cut seed with flowers or sulfur. This aids in forming a callous over the wound, and keeps the piece from drying out too rapidly.

POTATO PLANTING

Amount of Seed Needed.—The number of bushels of seed required to plant an acre of potatoes is usually from 12 to 15 bushels. The amount varies with the distance of planting. This, in turn, will be governed by the variety and size of the seed piece, the larger pieces being spaced farther in the rows.

Early varieties may be planted closer than late varieties because the habit of growth is more upright, and less room is required. On well prepared soil the planting of Early Ohios and Cobblers may be made from 30 to 34 inches between rows, and from 8 to 12 inches in the row. This would require from 30 to 40 bushels of seed. Planting 32 inches by 12 inches will require from 25 to 30 bushels of seed.

Late varieties may be planted from 34 to 36 inches between rows and from 12 to 14 inches in the row. This will require from 17 to 24 bushels of seed.

The average rate of planting in Ohio is, as a whole, too low; larger rates per acre will give increased yields and much more than pay for the additional seed used. It must be remembered, however, that the soil fertility should be high and a good application of fertilizer used. A closer planting will also tend to hold down the production of oversize potatoes that are prevalent in the northern part of the state, with the late varieties.

Depth of Planting.—This depends on the type of soil. In sandy soils, a depth of 4 to 5 inches is necessary; in the heavier soils 3 to 4 inches is deep enough.

Methods of Planting.—Potatoes are either dropped by hand or with horse drawn planters. In southern Ohio, where the acreages may be small, many growers still drop by hand, but the larger acreages are planted by machine.

There are two types of planting machines in use, the one-man or picker type, and the two-man type.

In the picker type the seed pieces are picked up by forks attached to a vertical disk which passes through the compartment containing the seed pieces. The seed, which must be blocky, is picked up and stripped off as it passes between two attachments and drops in the planting tube. With this type of machine the accuracy of planting depends on the uniformity of size of the seed pieces.

The two-man machine picks up the seed pieces with a revolving cogged wheel, and deposits them in the pockets of a revolving disk. This disk discharges the seed piece as it passes over the planting tube. The accuracy of this machine depends upon the man at the rear, who must see that every pocket contains one seed piece.

Time of Planting.—The time of planting depends on the purpose for which the crop is grown. In the early section of southern Ohio planting starts in late March or early April, depending on the season, and the time that the soil can be put in shape. Late potatoes in this section are usually planted from the middle to the last of July.

In the northern part of the state late varieties are grown principally, and planting is usually not made until the middle to the last of June, though when an earlier crop is desired plantings are sometimes made in May.

CULTURAL METHODS

Cultivation must start immediately after planting. After the potatoes are covered a ridge is left, and this is broken down by going over the field with a spike-tooth harrow, with the rows. After a few days the field is again cultivated with the harrow, driving across the rows. These cultivations are two of the most important given, as at this time the weeds are very small and have not rooted deep. These weeds, if not taken care of at this time, cause trouble all through the season and compete very heavily with the growing crop for moisture and food.

Sometimes the field is harrowed and cross harrowed following planting, and another harrowing given at the time a few of the seedlings are showing.

The next cultivation is with a cultivator. In many fields a riding cultivator is used, and the cultivation is usually deep and close to the rows, loosening up the soil close in the row. Following cultivations should be shallower and farther from the rows to prevent injury to the crop by cutting off the roots. The last cultivation should come about the time the vines are in blossom, and at this time soil is thrown towards the row well up to the vines. This protects the tubers that are forming close to the surface, and prevents them from burning or greening.

Level cultivation is recommended except in cases where the soil is very heavy and inclined to be wet, where the drainage is poor. Under these conditions ridging may be practiced with success, but in lighter soils and soils that are well drained ridging is very apt to be disastrous, especially if the season should turn a little dry.

POTATO SPRAYING

Two of the most serious troubles in Ohio fields are early blight and leaf hoppers.

Early Blight is a fungous disease which attacks the vine growth only. It appears on the leaves as small brown or blackish spots having concentric circles, and as these spots enlarge may affect the entire leaf, causing it to die prematurely, thus damaging the crop by cutting off the food and moisture supply. This disease can be controlled by four applications of Bordeaux mixture, 5-7½-50.

Late Blight, which at times causes considerable damage, may also be controlled by Bordeaux spray.

The Leaf Hopper is a small sucking insect which works mainly on the underside of the leaf surface. It is chiefly responsible for the damage formerly known as tip burn. As the insects are extremely hard to kill, the best measure of control is one of prevention, and this may be accomplished by using a Bordeaux spray. The same spray that is effective for early blight controls this pest.

Bordeaux spray, to be effective, must be applied at a pressure ranging from 150 to 200 pounds, and must be applied to the undersides of the leaves as well as the top. This requires three nozzles per row, two directing the spray upward and one that shoots down.

(Additional instructions on spraying can be obtained in Ohio Agricultural Station Bulletin 368.)

Other diseases such as mosaic, leaf roll, wilt, etc., can best be avoided by planting certified seed.

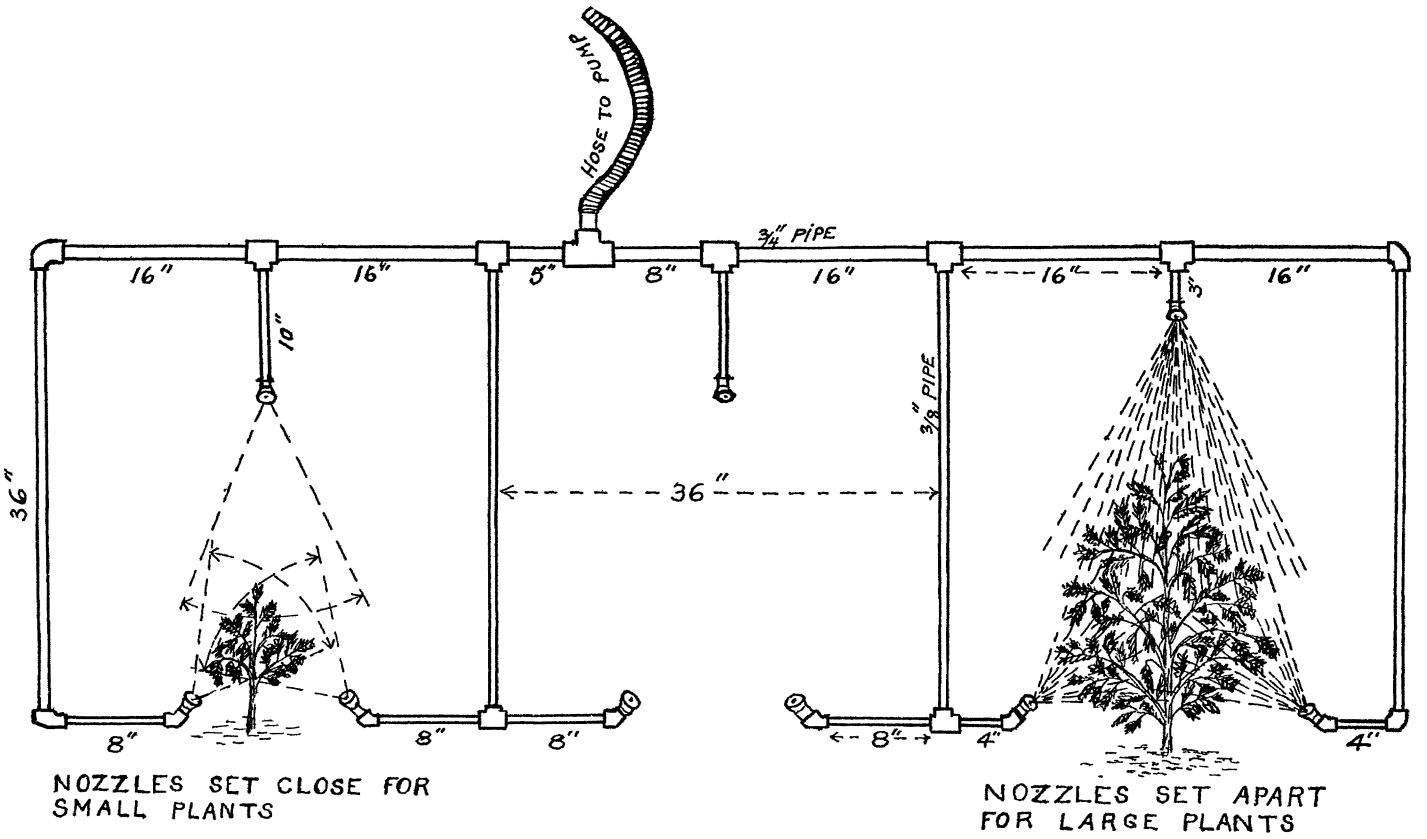


Fig. 8. Spray boom for covering both sides of foliage This boom can be made and attached to any good traction or power vegetable crop sprayer. The figures given represent a boom for spraying three rows 3 feet apart. Potato blight and hopperburn control require this kind of a sprayer.

HARVESTING THE CROP

The time of harvest depends upon the market sought. In the early section of the state digging usually starts the last of June or the first of July, and the early crop is generally moved by July 15 to 30, though in large acreages harvesting sometimes is continued until early September.

However, if there is any tendency towards scabbing this latter practice is not to be encouraged, as scab will develop very rapidly when the potatoes are left in the ground.

In the late section harvesting may start in September and continue until October. If the season is late and frost does not kill the vines until the middle or last of October, harvesting is often delayed until that time.

Potatoes are usually dug with either the common two-horse plow, or with a digger of the elevator type. With the two-horse plow a great deal of care must be used, especially if the soil has become hard, for too shallow a furrow will produce a large number of cut and bruised potatoes.

The elevator type of digger usually gives the best results. The point of the digger is set just beneath the plants, and the entire plant and tubers are raised and pass over a series of rotating fingers. The vines are delivered on one side and the potatoes on the other. This is the most satisfactory way to handle the crop, as the least amount of cutting and bruising takes place.

The potatoes are then either put in crates or in sacks and hauled to the barn or other buildings, where they may be graded and stored, or delivered to market.

GRADING

Careful grading as to size and quality is very essential. Potatoes that are of good quality and grade always bring a premium over ungraded stock. Too often the local markets are hurt by poorly graded stock being offered, and this affects the good grower as well as the poor.

There are several good graders on the market at reasonable prices. If desired, the tubers may be graded by hand and the culls taken out at the same time the potatoes are sorted for sizes.

The following standard grades are recommended by the United States Department of Agriculture (Department Circular 238, July, 1922).

U. S. NO. 1

U. S. No. 1 shall consist of potatoes of same varietal characteristics which are not badly mis-shapen, which are free from freezing injury and soft rot, and from damage caused from dirt or other foreign matter, sunburn, second growth, growth cracks, hollow heart, cuts, scab, blight, dry rot, disease, insects or mechanical or other means.

The diameter of potatoes of round varieties shall be not less than 1⅞ inches, and of potatoes of long varieties, 1¾ inches.

In order to allow for variations incident to proper grading and handling, not more than 5 per cent (by weight) of any lot may be below the prescribed size, and, in addition, not more than 6 per cent (by weight) may be below the remaining requirements of this grade, but not to exceed one-third of this 6 per cent tolerance shall be allowed for potatoes affected by soft rot.

U. S. NO. 1 SMALL

U. S. No. 1 Small shall consist of potatoes ranging in size from 1½ to 1⅞ inches in diameter, but meeting all other requirements of U. S. No. 1.

In order to allow for variations incident to proper grading and handling, not more than 25 per cent (by weight) of any lot may vary from the prescribed size, but not to exceed one-fifth of this tolerance shall be allowed for potatoes under 1½ inches in diameter.

In addition not more than 6 per cent (by weight) may be below the remaining requirements of this grade, but not to exceed one-third of this 6 per cent tolerance shall be allowed for potatoes affected by soft rot.

U. S. NO. 2

U. S. No. 2 shall consist of potatoes of similar varietal characteristics which are free from freezing injury and soft rot, and from serious damage caused by sunburn, cuts, scab, dry rot, disease, insects, or mechanical or other means.

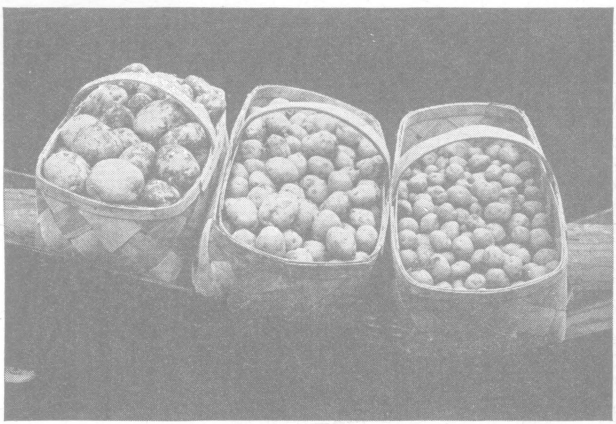


Fig. 9. United States grades No. 1, No. 2, and Culls.

The diameter of the potatoes of this grade shall be not less than 1½ inches.

In order to allow for variations incident to proper grading and handling, not more than 5 per cent (by weight) of any lot may be below the prescribed size, and, in addition, not more than 6 per cent (by weight) may be below the remaining requirements of this grade, but not to exceed one-third of this 6 per cent tolerance shall be allowed for potatoes affected by soft rot.

U. S. FANCY NO. 1

U. S. Fancy No. 1 shall consist of potatoes of one variety which are mature, bright, well shaped, free from freezing injury, soft rot, dirt or other foreign matter, sunburn, second growth, growth cracks, hollow heart, cuts, scab, blight, dry rot, disease, insect or mechanical injury, and other defects. The range in size shall be stated in terms of minimum and maximum diameters or weights following the grade name, but in no case shall the diameter be less than 2 inches.

In order to allow for variations incident to proper grading and handling, not more than 5 per cent (by weight) of any lot may vary from the range of weight and size stated, and, in addition, not more than 6 per cent (by weight) of any lot may be below the remaining requirements for this grade, but not to exceed one-third of this 6 per cent tolerance shall be allowed for potatoes affected by soft rot.

COST OF PRODUCTION

In the production of potatoes the holding of the cost to the lowest possible point without decreasing the yield per acre is the aim of all growers. The lowest cost per acre, however, does not always mean the lowest cost per bushel, which is the factor of greatest interest to the grower.

From cost account work in northeastern Ohio, shown in the following table, it is seen that the larger yields, also having the largest cost per acre, produced the crop cheaper by the bushel.

*EFFECT OF YIELD ON COST PER BUSHEL

Yield per acre	Number farms	Acres in potatoes	Av. yield per acre	Av. cost per acre	Cost per bushel
Over 200 bu.....	7	25	241	$148.29	$0.61
150 to 200 bu.....	8	29¼	175	123.16	.70
100 to 150 bu. ...	11	41¼	134	114.54	.86
Less than 100 bu..	3	16	84	110.82	1.32
All farms.....	29	111½	161	123.83	.77

Additional figures available from this report give the various costs of production on the 29 farms as follows:

	Man hours	Horse hours	Tractor hours	Seed cost	Manure per acre	Fertilizer per acre	Use of land	Spray cost	Use of mach'y
Av.per acre	66.5	61.7	1.2	18.90	25.50	4.90	14.00	4.10	5.00

It is very evident that the cost of production is directly correlated with the yields, and that yields will depend on the individual skill of the grower. The net returns to the grower will not be satisfactorily solved until he has raised the yield per acre by up-to-date methods, as heavier fertilizing, spraying, purchase of high grade seed, and better methods of culture, harvesting, and of marketing a good standard grade.

* Department of Rural Economics. Ohio State University. 1923.